

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 2

Amendments to the Claims:

1. (Currently amended) A sensor device comprising:
a support structure;
a sensing element mounted on said support ~~substrate~~ structure for sensing optical radiation and generating an electrical output signal in response thereto; and
an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and ~~redirecting~~ reflecting optical radiation that is not incident on the lens portion onto the active surface of said sensing element.
2. (Original) The sensor device of claim 1, wherein said support structure is a portion of a lead frame.
3. (Original) The sensor device of claim 2, wherein said portion of the lead frame includes at least two leads electrically coupled to said sensing element, and wherein said leads are retained by said encapsulant.
4. (Original) The sensor device of claim 1, wherein said lens portion is elliptical.
5. (Original) The sensor device of claim 4, wherein the major axis of said elliptical lens portion is aligned with the optical axis of the sensor device.

Applicant . : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 3

6. (Currently amended) The sensor device of claim 5, wherein said optical radiation
~~collecting~~ collector portion includes a parabolic surface.

7. (Original) The sensor device of claim 6, wherein said parabolic surface redirects incident
optical radiation towards said sensing element by total internal reflection.

8. (Currently amended) The sensor device of claim 7, wherein said optical radiation
~~collecting~~ collector portion includes an annular light receiving surface that lies in a plane
perpendicular to the major axis of said elliptical lens portion and is disposed around said
elliptical lens portion.

9. (Currently amended) The sensor device of claim 1, wherein said ~~light collecting~~ optical
radiation collector portion includes a parabolic surface.

10. (Original) The sensor device of claim 9, wherein said parabolic surface redirects incident
optical radiation towards said sensing element by total internal reflection.

11. (Original) The sensor device of claim 1, wherein said sensing element is sensitive to
visible light.

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 4

12. (Original) The sensor device of claim 1, wherein said sensing element comprises:

a light transducer exposed to light, the light transducer operative to accumulate charge in proportion to light incident over an integration period; and

a sensor logic circuit in communication with the exposed light transducer, the sensor logic circuit operative to output a discrete light signal according to the accumulated exposed light transducer charge.

13. (Currently amended) The sensor device of claim 12, wherein said ~~light collecting~~ optical radiation collector portion includes a parabolic surface.

14. (Original) The sensor device of claim 12, wherein said integration period is variable in response to a received integration signal.

15. (Original) The sensor device of claim 12, wherein the integration period is of a length of time that is predetermined prior to accumulation of charge during the integration period.

16. (Original) The sensor device of claim 1, wherein said encapsulant is made of an epoxy.

17. (Currently amended) A sensor assembly comprising:

a housing having an aperture;

a diffusing element positioned across said aperture; and

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 5

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical signal in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define an optical radiation collector portion ~~having a parabolic reflecting surface~~ for collecting and redirecting incident optical radiation towards said sensing element ~~by total internal reflection~~.

18. (Original) The sensor assembly of claim 17, wherein said encapsulant being further configured to define a lens portion centrally located within said optical radiation collector portion for focusing incident optical radiation onto an active surface of said sensing element.

19. (Original) The sensor assembly of claim 18, wherein said lens portion is elliptical.

20. (Original) The sensor assembly of claim 19, wherein the major axis of said elliptical lens portion is aligned with the optical axis of the sensor device.

21. (Original) The sensor assembly of claim 20, wherein the optical axis of the sensor device is aligned with the center of said aperture.

Applicant .: Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 6

22. (Original) The sensor assembly of claim 17, wherein said support structure is a lead frame having at least first and second electrical leads electrically coupled to said sensing element.

23. (Original) The sensor assembly of claim 22, wherein said sensing element is mounted on one of said first and second electrical leads.

24. (Original) The sensor assembly of claim 23 and further including a wire bond extending from one of said first and second electrical leads to said sensing element.

25. (Original) The sensor assembly of claim 17, wherein the diffusing element is used to characterize the field of view.

26. (Original) The sensor assembly of claim 25, wherein the diffusing element is further characterized so that the expanse of the field of view is greater in one direction than in another.

27. (Currently amended) A vehicle accessory for mounting in a vehicle, said vehicle accessory comprising:

 a sensor device comprising:

 a support structure;

 a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 7

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and ~~redirecting~~ reflecting optical radiation that is not incident on the lens portion onto the active surface of said sensing element.

28. (Currently amended) The A vehicle accessory of claim 27, for mounting in a vehicle, said vehicle accessory comprising:

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and redirecting optical radiation that is not incident on the lens portion onto the active surface of said sensing element,

wherein the vehicle accessory is a rearview mirror assembly, and wherein said sensor device is included in said rearview mirror assembly.

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 8

29. (Currently amended) The vehicle accessory of claim 28, wherein the rearview mirror is assembly comprises an electrochromic mirror element.

30. (Original) The vehicle accessory of claim 29 and further comprising a processing circuit coupled to said sensor device for controlling said electrochromic mirror in response to light levels sensed by said sensing element.

31. (Original) The vehicle accessory of claim 30, wherein said sensor device is aimed forward of the vehicle for sensing ambient light levels.

32. (Original) The vehicle accessory of claim 30, wherein said sensor device is aimed rearward of the vehicle for sensing glare.

33. (Original) The vehicle accessory of claim 30 and further comprising a second sensor device for sensing light levels from sources in a different field of view from the first sensor device.

34. (Currently amended) The vehicle accessory of claim 33, wherein said second sensor device comprises:

a second support structure;

a second sensing element mounted on the second support structure for sensing optical radiation and generating an electrical output in response thereto; and

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 9

~~an~~ a second encapsulant encapsulating said second sensing element on said second support structure, said second encapsulant being configured to define a second lens portion for focusing incident optical radiation onto an active surface of said second sensing element, and ~~an~~ a second optical radiation collector portion surrounding the second lens portion for collecting and redirecting optical radiation that is not incident the second lens portion onto the active surface of said second sensing element.

35. (Original) The vehicle accessory of claim 30, wherein said processing circuit is further configured to generate light control signals to control at least one vehicle light in response to light levels sensed by said sensing element.

36. (Original) The vehicle accessory of claim 28 and further comprising a processing circuit coupled to said sensor device for generating light control signals to control at least one vehicle light in response to light levels sensed by said sensing element.

37. (Currently amended) ~~The~~ A vehicle accessory ~~of claim 27 and further~~ for mounting in a vehicle, said vehicle accessory comprising:

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 10

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and redirecting optical radiation that is not incident on the lens portion onto the active surface of said sensing element; and

a processing circuit coupled to said sensor device for generating light control signals to control at least one vehicle light in response to light levels sensed by said sensing element.

38. (Original) The vehicle accessory of claim 37, wherein said at least one vehicle light includes vehicle headlamps and said processing circuit controls the on/off state of the vehicle headlamps.

39. (Original) The vehicle accessory of claim 37, wherein said at least one vehicle light includes interior display lights.

40. (Currently amended) ~~The~~ A vehicle accessory ~~of claim 27 and further~~ for mounting in a vehicle, said vehicle accessory comprising:

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 11

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and redirecting optical radiation that is not incident on the lens portion onto the active surface of said sensing element; and

a processing circuit coupled to said sensor device for generating windshield wiper control signals to control windshield wipers of the vehicle in response to light levels sensed by said sensing element.

41. (Currently amended) ~~The A vehicle accessory of claim 27 and further~~ for mounting in a vehicle, said vehicle accessory comprising:

a sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define a lens portion for focusing incident optical radiation onto an active surface of said sensing element, and an optical radiation collector portion surrounding the lens portion for collecting and redirecting optical radiation that is not incident on the lens portion onto the active surface of said sensing element; and

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 12

a processing circuit coupled to said sensor device for generating climate control signals to control a climate control system of the vehicle in response to light levels sensed by said sensing element.

42. (Original) The vehicle accessory of claim 41, wherein said sensor device is positioned to sense sun loading on the vehicle.

43. (Currently amended) A vehicle accessory for mounting in a vehicle, said vehicle accessory comprising:

- a housing having an aperture;

- a diffusing element positioned across said aperture; and

- a sensor device comprising:

- a support structure;

- a sensing element mounted on said support structure for sensing optical radiation and generating an electrical signal in response thereto; and

- an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define an optical radiation collector portion ~~having a parabolic reflecting surface~~ for collecting and redirecting incident optical radiation towards said sensing element ~~by total internal reflection~~.

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 13

44. (Currently amended) A sensor device comprising:

a support structure;

a sensing element mounted on said support structure for sensing optical radiation and generating an electrical output in response thereto; and

an encapsulant encapsulating said sensing element on said support structure, said encapsulant including an integral lens for directing incident optical radiation toward said sensing element; and

a light collector surrounding the integral lens for collecting and ~~redirecting~~ reflecting optical radiation that is not incident on the lens onto the active surface of said sensing element.

45. (New) The sensor assembly of claim 17, wherein said optical radiation collector portion has a parabolic reflecting surface for collecting and reflecting incident optical radiation towards said sensing element.

46. (New) The sensor assembly of claim 17, wherein said optical radiation collector portion collects and redirects incident optical radiation towards said sensing element by total internal reflection.

47. (New) The vehicle accessory of claim 43, wherein said optical radiation collector portion has a parabolic reflecting surface for collecting and reflecting incident optical radiation towards said sensing element.

Applicant : Jon H. Bechtel et al.
Appln. No. : 10/068,540
Page : 14

48. (New) The vehicle accessory of claim 43, wherein said optical radiation collector portion collects and redirects incident optical radiation towards said sensing element by total internal reflection.

49. (New) A vehicle accessory for mounting in a vehicle, said vehicle accessory comprising:

- a housing having an aperture;

- a secondary optical element positioned across said aperture; and

- a sensor device comprising:

- a support structure;

- a sensing element mounted on said support structure for sensing optical radiation and generating an electrical signal in response thereto; and

- an encapsulant encapsulating said sensing element on said support structure, said encapsulant being configured to define an optical radiation collector portion for collecting and redirecting incident optical radiation towards said sensing element.